



Full Steam Ahead !

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MECS, Inc.
St. Louis, Missouri

Package Boiler System Proposal

For:

Global Ethanol – 100 MMGPY Plants
(Wayne City, IL & Belmond, Iowa)

Presented To: **Ms. Mary Eudy**
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Victory Energy Proposal No.: VE-2349r.4

MECS-I-1085



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SECTION 2.0 PACKAGE BOILER GENERAL INFORMATION

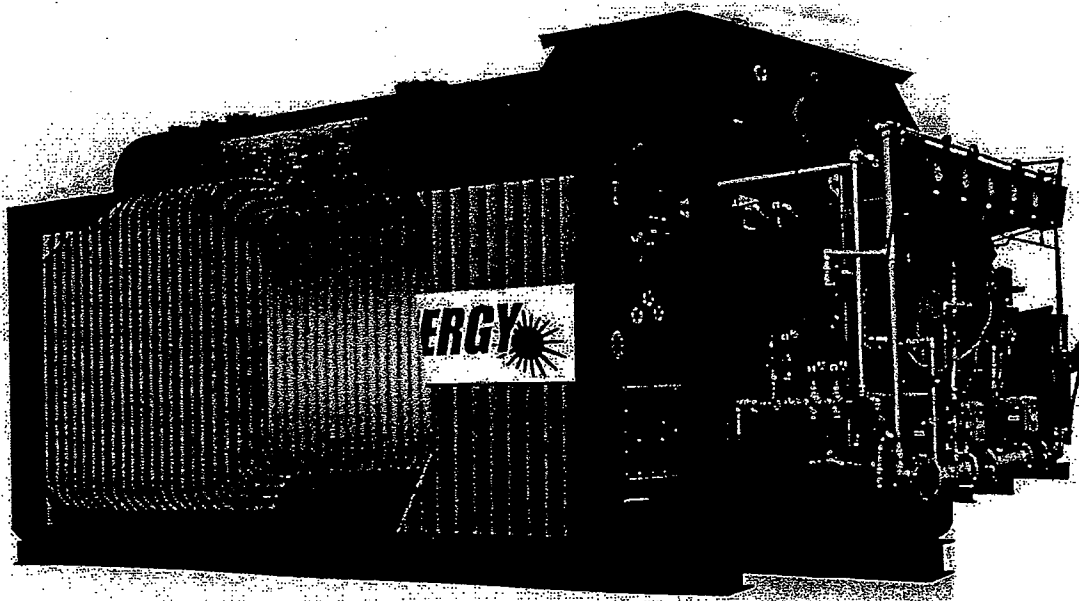
Victory Energy Operations, LLC proposes to furnish a "VEO" custom steam generating system to be utilized by MECS, Inc. at the Global Ethanol jobsites. Each boiler will be designed with the following characteristics:

	<u>Base Bid</u>
➤ Quantity:	Two (2) Boilers @ each project site
➤ Capacity	150,000 lbs/hr each
➤ Design Pressure:	250 PSIG
➤ Operating Pressure:	150 PSIG – Saturated Steam
➤ Operating Temperature:	366 °F at the NRV outlet
➤ Feedwater Temperature:	227 °F
➤ Primary Fuel:	Natural Gas
➤ Boiler Location:	Indoors

The "O" style boiler design offers the least amount of furnace refractory compared to other designs. The tube and membrane seal welded front and rear walls virtually eliminates all refractory in the furnace, other than localized seals and refractory coverage of the water cooled burner throats. This design greatly reduces maintenance costs and offers increased unit availability. The furnace sidewalls are tube and membrane construction for the entire length of the furnace to eliminate the possibility of gas bypassing. The outer sidewalls are also tube and membrane design for gas tight construction. This design offers 100% water cooling and the ability to provide an extremely fast ramp rate.

The furnace wall tubes of any boiler encounter the highest heat flux. The "O" type design, has the shortest furnace wall tubes in the industry. This advantage removes heat from the furnace quickly and extends boiler life.

The "O" design has a single lower drum which reduces maintenance compared to other designs that may have two lower drums or headers. The single large diameter drum makes it easier to perform inspections and to maintain lower tube connections. The steam drum will contain steam separation equipment.





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BOILER (CONT'D)

Boiler Wall Construction

The outer lagging of the boiler will have an average surface temperature of 140 Deg. F ambient with 2 MPH wind velocity. The boiler walls include the following:

- The furnace sides, roof and floor consists of a tube and membrane design. The wall is constructed with 2" O.D. tubes with 1" wide by 1/4" thick steel membranes welded to each tube.
- The front wall consists of a tube and membrane design. The first layer is 2" O.D. tubes with 2" exposed width by 1/4" thick carbon steel membranes welded to the tubes. The second layer is 3" of 1200 Deg. F. board insulation. The outer surface is 24 gauge Carbon Steel lagging properly stiffened.
- The rear wall consists of a tube and membrane design. The first layer is 2" O.D. tubes with 2" exposed width by 1/4" thick carbon steel membranes welded to the tubes. The second layer is 3" of 1200 Deg. F. board insulation. The outer surface is 24 gauge carbon steel lagging properly stiffened.
- The outer boiler side wall will be a tube and membrane design. The first layer is 2" O.D. tubes with 1" wide by 1/4" thick carbon steel membrane welded to the tubes. The second layer is 3" of 1200 Deg. F. board insulation. The outer surface is 24 gauge carbon steel lagging properly stiffened.
- The drum will be insulated with 2" of 1200 Deg. F. blanket insulation. The outer lagging shall be 24 gauge carbon steel.
- Drum heads (Steam Drum & Lower Water Drum) shall be insulated with 2" of 1200 Deg. F blanket insulation. The outer casing shall be manufactured from 12 gauge carbon steel properly stiffened.



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BOILER (CONT'D)

Boiler Access and Observation Ports

The furnace is accessible through one (1) 12" x 16" rear wall access door. The rear wall also includes two (2) 3" diameter self closing, air purged observation ports.

Steam Purification

The upper (steam) drum includes steam purifiers. These steam purifiers include a dry pan and a baffle. This steam purification system is designed to produce 0.50% moisture carry over based on ABMA maximum boiler water concentration standards.

Structural Base

The boiler includes a rigid structural steel base frame designed to distribute the loads onto a flat concrete foundation. The boiler is designed to be anchored at the front (anchor bolts are required and supplied by others) with thermal expansion towards the rear. Two (2) 12" x 16" structural base access doors are included for access underneath each boiler.

Painting

Preparation and painting will be done in accordance with the "Base" system shown on the following page.

Piping, Trim and Accessories

- Water level piping to water column and auxiliary water cutout
- Drain piping for water column water gauge glass, auxiliary cutout, and pressure gauge drain to approximately four (4) feet above boiler base.
- Steam pressure piping to pressure gauge
- Air piping to deliver cooling air to the observation port shall be provided and installed by others
- The trim included in our scope of supply is listed on page 11 within this proposal.